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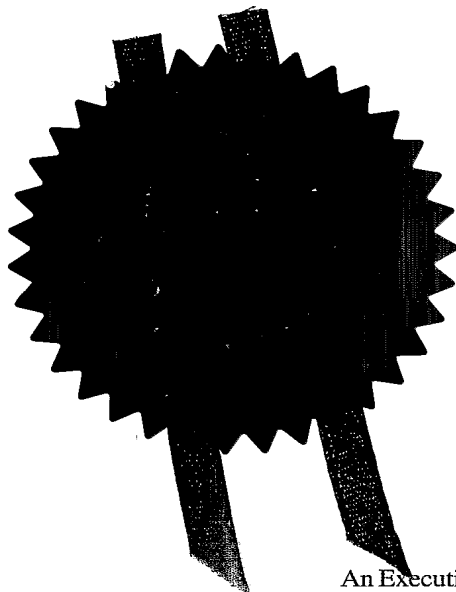
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1.	Your reference	**03.050-ipw/ph**
2.	Patent application number *(if you know it)*	**0329625.8**
3.	Full name of the or of each applicant	**IPWireless, Inc.**
4.	Title of the invention	**METHOD AND ARRANGEMENT FOR POWER CONTROL IN A RADIO COMMUNICATION SYSTEM**
5.	State how the applicant *(s)* derived the right from the inventor *(s)* to be granted a patent	**By virtue of the inventors' employment**
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I/We believe that the person *(s)* named over the page *(and on any extra copies of this form)* is/are the inventor *(s)* of the invention which the above patent application relates to.

Signature   Date

Peter D. Hudson   **24ᵗʰ December 2003**

8.	Name and daytime telephone number of person to contact in the United Kingdom	**Peter Hudson**	**01420 588399**

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Enter the full names, addresses and postcodes of the inventors in the boxes and underline the surnames

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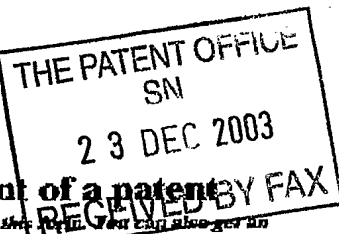
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1.	Your reference	03.050-ipw/ph

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3.	Full name, address and postcode of the or of each applicant *(underline all surnames)*	**IPWireless, Inc.** **1001 Bayhill Drive, 2nd Floor** **San Bruno, California** **CA 94066**
	Patents ADP number *(if you know it)*	08169401002
	If the applicant is a corporate body, give the country/state of its incorporation	**USA, Delaware**

4.	Title of the invention	**METHOD AND ARRANGEMENT FOR POWER CONTROL IN A RADIO COMMUNICATION SYSTEM**

5.	Name of your agent *(if you have one)*	**Peter Hudson**
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                          Signature   Date
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METHOD AND ARRANGEMENT FOR POWER CONTROL IN A RADIO COMMUNICATION SYSTEM

5 **Field of the Invention**

This invention relates to communication systems and
particularly (though not exclusively) to Time Division
Duplex (TDD) operation in radio communication systems.

10

Background of the Invention

In the field of this invention it is known that power
15 management of Forward Access Channel (FACH) transport
channels may be employed in a Universal Mobile
Telecommunication System (UMTS) radio communication
system.

20 In a 3rd Generation Partnership Project (3GPP) radio
communication system, the FACH is a common transport
channel used for downlink transmissions. Data destined
for a number of User Equipment units (UEs) may be mapped
onto FACH(s). The FACHs are then multiplexed by the
25 physical layer, mapped onto Coded Composite Transport
Channels (CCTrCHs), and transmitted on Secondary Common
Control Physical Channel (S-CCPCH) physical channels. UEs
receive the S-CCPCH physical channels, extract the
FACH(s) and identify data that is intended for them.
30 Typically the data to be sent on the FACH(s) is

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rescheduled every Transmission Time Interval (TTI) (where
TTI = 10, 20, 40 or 80 ms).

The concept of applying power management on the FACH is
5   well established in the prior art. For example, in
published US patent application no. US 2002/0094833 A1 it
is known that the transmit power is regulated according
to:
UE measurements
10   - received signal strength
        - SIR (Signal to Interference Ratio)
        - Error rates (Block Error Rate - BLER, Bit Error
          Rate - BER)
Current conditions in the cell
15   - traffic volume
        - % max BTS (percentage of maximum Base
          Transmitter Station) power in use.
Service requirements of the UE.

20   In document "MBMS Power Usage" (available from the 3GPP
website at www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_31/Docs/Zips/R2-
022110.zip) and document "Comparison of DSCH and FACH for
MBMS use" (available from the 3GPP website at
www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_31/Docs/Zips/R2-022110.zip) power
25   control of the FACH has also been suggested in 3GPP for
broadcast usage (MBMS, Multimedia Broadcast Multicast
Service). Here the suggestion is made that if the network
knows the geometry of the MBMS users in the cell, the
transmission power can be set just enough to serve all
30   users subscribing to the MBMS service instead of blindly
using the power to cover the whole cell.

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However, a disadvantage of these and similar prior art
schemes is the difficulty of estimation of the power
needs of individual UEs.

5

A need therefore exists for a method and arrangement for
power control in a radio communication system wherein the
abovementioned disadvantage(s) may be alleviated.

10

Statement of Invention

In accordance with the present invention there is
provided a method and arrangement for power control in a
15   radio communication system as claimed in claim 1.

Brief Description of the Drawing(s)

20   One method and arrangement for power control in a radio
communication system incorporating the present invention
will now be described, by way of example only, with
reference to the accompanying drawing(s), in which:

25   FIG. 1 shows a block schematic diagram illustrating
a 3GPP radio communication system in which the
present invention may be used;

           FIG. 2 shows a schematic diagram illustrating
30   multiplexing of FACH transport channels onto a
single CCTrCH;

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FIG. 3 shows a schematic diagram illustrating use of four CCTrCHs of S-CCPCH type to carry four FACHs;

5 FIG. 4 shows a block schematic diagram illustrating an power control arrangement incorporating an embodiment of the present invention;

FIG. 5 shows a schematic diagram illustrating an
10 arrangement of queued FACH traffic;

FIG. 6 shows a schematic diagram illustrating traffic queued by Transport Format Combination Set (TFCS) band and served one band at a time;

15

FIG. 7 shows a schematic diagram illustrating banding of UEs on the DSCH into different TFCSs; and

FIG. 8 shows a schematic diagram illustrating a FACH
20 power cost scheme.

Description of Preferred Embodiment(s)

25 The following preferred embodiment of the present invention will be described in the context of a UMTS Radio Access Network (UTRAN) system operating in TDD mode. Referring firstly to FIG. 1, a typical, standard UMTS Radio Access Network (UTRAN) system 100 is
30 conveniently considered as comprising: a terminal/user

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equipment domain 110; a UMTS Terrestrial Radio Access
Network domain 120; and a Core Network domain 130.

In the terminal/user equipment domain 110, terminal
5   equipment (TE) 112 is connected to mobile equipment (ME)
114 via the wired or wireless *R* interface. The ME 114 is
also connected to a user service identity module (USIM)
116; the ME 114 and the USIM 116 together are considered
as a user equipment (UE) 118. The UE 118 communicates
10 data with a Node B (base station) 122 in the radio access
network domain 120 via the wireless *Uu* interface. Within
the radio access network domain 120, the Node B 122
communicates with a radio network controller (RNC) 124
via the *Iub* interface. The RNC 124 communicates with other
15 RNC's (not shown) via the *Iur* interface. The Node B 122
and the RNC 124 together form the UTRAN 126. The RNC 124
communicates with a serving GPRS service node (SGSN) 132
in the core network domain 130 via the *Iu* interface.
Within the core network domain 130, the SGSN 132
20 communicates with a gateway GPRS support node (GGSN) 134
via the *Gn* interface; the SGSN 132 and the GGSN 134
communicate with a home location register (HLR) server
136 via the *Gr* interface and the *Gc* interface
respectively. The GGSN 134 communicates with public data
25 network 138 via the *Gi* interface.

Thus, the elements RNC 124, SGSN 132 and GGSN 134 are
conventionally provided as discrete and separate units
(on their own respective software/hardware platforms)
30 divided across the radio access network domain 120 and
the core network domain 130, as shown in FIG. 1.

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The RNC 124 is the UTRAN element responsible for the
control and allocation of resources for numerous Node B's
122; typically 50 to 100 Node B's may be controlled by

5   one RNC. The RNC also provides reliable delivery of user
traffic over the air interfaces. RNC's communicate with
each other (via the *Iur* interface) to support handover and
macrodiversity.

10   The SGSN 132 is the UMTS Core Network element responsible
for Session Control and interface to the HLR. The SGSN
keeps track of the location of an individual UE and
performs security functions and access control. The SGSN
is a large centralised controller for many RNCs.

15

The GGSN 134 is the UMTS Core Network element responsible
for concentrating and tunnelling user data within the
core packet network to the ultimate destination (e.g.,
internet service provider - ISP).

20

Such a UTRAN system and its operation are described more
fully in the 3GPP technical specification documents
3GPP TS 25.401, 3GPP TS 23.060, and related documents,
available from the 3GPP website at www.3gpp.org, and need

25   not be described in more detail herein.

FIG. 2 illustrates one use of the FACH. Here two FACH
transport channels (FACH1, 210; FACH2, 220) are mapped to
the same CCTrCH, 230, that is carried on a number of S-

30   CCPCH physical channels. FACH1 carries either 0 or 1 user
plane transport block, whilst FACH 2 carries either 0, 1

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or 2 blocks of signalling traffic. Either a user plane block or 2 signalling blocks may be carried by the CCTrCH.

5   FACH2 is shared amongst all UEs, even during the same TTI. The UE, on receiving the S-CCPCH, identifies which signalling blocks are directed to itself by the UE ID field in the Medium Access Control (MAC) header (as described in 3GPP technical specification document
10   25.321, available from the 3GPP website) for the case of DCCH (Dedicated Control Channel) logical channel or by inspection of the UE ID within the RRC (Radio Resource Control) message for the case of CCCH (Common Control Channel) and SHCCH (Shared Control Channel).

15

To accommodate the variable rate of the CCTrCH, the number of physical codes is adjusted, and the Transport Format Combination Indicator (TFCI) carried on the physical channel is used to identify this choice (as
20   described in 3GPP technical specification document 25.221, available from the 3GPP website).

Since the FACH is a common channel, the physical channels need to be transmitted with sufficient power such that
25   all UEs targeted are able to decode the content. Typically the transmission has taken place at full power so that even if a UE at the cell edge is targeted, it would be able to decode the transmission (this is a worst case assumption). However, this is potentially wasteful
30   of power if, for example, all the UEs targeted were to lie near the cell centre. Clearly, by only transmitting

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with sufficient power to satisfy the user with the
greatest path loss from the basestation, power could be
saved which may be exploited by other physical channels
(not S-CCPCH). Furthermore, there is the alternative of
5   scheduling more FACH blocks within the same (maximum)
power.

FIG. 3 shows an alternative approach to using the FACH.
Here four CCTrCHs (CCTrCH1, 310; CCTrCH2, 320; CCTrCH3,
10   330; CCTrCH4, 340), each of S-CCPCH type, are
established, each supporting a single FACH. During a
transmission a single FACH only carries traffic for a
single UE. The UEs within the cell are subdivided into
those that listen to CCTrCH1 only, those that listen to
15   CCTrCH2 only, etc.

In this arrangement, without knowledge of the power
requirements of different UEs the worst case must be
assumed, where each FACH is carrying data to a UE at the
20   extreme cell edge, and each CCTrCH consumes the
corresponding power.

It is apparent that gains in throughput (or reductions in
power consumption) are achievable if some form of power
25   control can be introduced, whether a single S-CCPCH
CCTrCH (as in FIG. 2) or many (as in FIG. 3) are
employed.

As will be explained in greater detail below, an
30   important feature of the present invention, at least in
its preferred embodiment, is the use of power control to

a UE on the downlink shared channel (DSCH) to determine
the UEs power requirement on the FACH.

Referring now to FIG. 4, a power control arrangement 400
5   for implementing such an embodiment of the present
invention includes a module 410 for deriving DSCH power
control information, and a module 420 for receiving the
DSCH-derived power control information and for performing
in dependence thereon FACH power control. Whilst not
10   inapplicable for Frequency Division Duplex (FDD)
operation, this scheme is particularly well suited to TDD
operation. This is because in TDD the DSCH may be used in
the same UE state as the FACH (this is called 'Cell FACH
state') without the need to allocate dedicated resources
15   (as described in 3GPP technical specification document
25.331, available from the 3GPP website). In other words,
a UE can be served on the DSCH, power information can be
extracted using the DSCH power control mechanism, and
then the UE can be rapidly and easily served on the FACH,
20   exploiting the power information gleaned from the DSCH
operation. DSCH operation in Cell FACH state is not
possible for FDD; the UE must move to Cell DCH state
where it is granted dedicated resource, in which it may
receive DSCH (and FACH too, although this requires that
25   the UE has the capability to decode three CCTrCHs at the
same time).

Referring now to FIG. 5, in a preferred embodiment of the
present invention the FACH blocks are queued in one of n
30   queues 510_1, 510_2...510_n, according to the CCTrCH that the
targeted UE is listening to. Each CCTrCH may employ up to

k_l spreading factor 16 (SF16) codes. The code sets allotted to each CCTrCH are disjoint; the total number of codes over all CCTrCHs must be less than or equal to 16.

5   Pseudo code for the operation of the FACH scheduler is given below. The key operation is the calculation of the power cost of a CCTrCH when supporting a transport format combination (TFC). A TFC represents a particular combination of FACH blocks on the FACH transport channels
10   of the CCTrCH. The power cost is defined as the fraction of the maximum transmit power of the basestation. To calculate the power cost, p, we calculate the difference of:

- the wanted signal divided by the level of noise
15   + interference (C/I) at the UE j if it were to be served with the complete basestation power $C/I_{max,j}$ (this is determined from the DSCH power control to the UE), and

- the C/I required to support the TFC, C/I_{TFC}
20   where both quantities are measured in dB, i.e.:

$$p_{TFC,j} = 10^{(C/I_{max,j} - C/I_{TFC})/10}$$

It will be understood that, as used herein, the terms 'noise' and 'interference' are to be considered
25   synonymous, with each encompassing both noise and interference, and that the term 'signal/interference' encompasses 'signal/(noise + interference)'.

Since FACH blocks may be scheduled from more than one UE
30   onto the same CCTrCH, the power cost should be calculated

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assuming the worst case of the UEs scheduled, i.e., the
UE with the smallest $C/I_{max,j}$.

```
Queue = start_queue    /* e.g. every run of the algorithm
                          we increment the start_queue by 1
                          (modulo n) */
    Do
        Do
            Take the next FACH transport block from
            'queue'
            Calculate TFC resulting from adding the
            block
            Calculate power cost for this CCTrCH
            carrying TFC
            Accept FACH block to schedule if
            cumulative power cost of all CCTrCHs <= 1
        While (cumulative power cost of all CCTrCHs <= 1 AND
        k_queue codes can take more blocks AND queue is not
        empty)
        Queue = (queue + 1)mod n       /* go to next queue */
    While (cumulative power cost of all CCTrCHs <= 1 AND NOT
    all queues addressed)
```

Note: if DSCH power control information is not available
for UE j, the scheduler should assume the user lies at the
cell edge, and use a $C/I_{max,j}$ value appropriate for such a
user, either preprogrammed within the scheduler or
updated in response to information obtained from DSCH

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power control (the scheduler would maintain the minimum value of $C/I_{max,j}$ of all UEs served).

5   It should be noted that the C/I_{TFC} values may be fixed (and preprogrammed into the scheduler) or updated continuously according to measurements made by UEs.

If the FACH CCTrCH is configured to support a number of UEs in the same transmission, it is advantageous to serve

10   UEs with approximately the same $C/I_{max,j}$ at the same time, since the worst-case $C/I_{max,j}$ is assumed by the scheduler, as discussed above. One embodiment that exploits this, for the case when there is a single FACH CCTrCH ($n=1$), is shown in FIG. 6. Here queue Q1 is subdivided into 8

15   subqueues, denoted TFCS1 to TFCS8 (610_1, 610_2...610_8), and users are placed in the subqueue which reflects their $C/I_{max,j}$ value. In this embodiment, these correspond to the TFCS banding employed (see below). Different mechanisms for serving the subqueues can be employed; FIG. 5

20   illustrates a round-robin scheduler 620 that addresses a different subqueue for each transmission.

In another embodiment of the invention, suppose the usage of FACHs is as shown in FIG. 5; although, each CCTrCH is

25   restricted to use two codes (not four, because of hardware limitations of the UE receiver). According to the UEs power requirements on the DSCH, a UE is banded into one TFCS, from TFCS 1 to TFCS8 (710), plus "TFCS1 cell edge 1" (720) and "TFCS1 cell edge 2" (730) bands,

30   as shown in FIG. 7. Essentially, the different TFCSs from

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1 to 8 express the channel coding rate that may be
employed with a given transmit power to the UE, whilst
attaining the required signal to noise ratio. For
example, UEs near the cell centre experience low path
5   loss and low interference; they are placed in TFCS8 which
has a code rate close to unity (i.e., it has very little
redundancy to protect against noise). In contrast, with
TFCS1, used by UEs that are very close to the cell edge,
the code rate is approximately   - a lot more error
10 protection is required at the cell edge. UEs that
experience a C/I lower than the TFCS1 band are assigned
to "TFCS1 cell edge 1", or "TFCS1 cell edge 2". In the
cell edge 1 band a UE is given twice the power per code
of a TFCS1 UE, and in cell edge 2 the UE is given four
15 times the power per code. This is accomplished by
limiting the number of codes used in a timeslot (compared
to TFCS1, half the number of codes is used in cell edge 1
and a quarter of the number of codes is used in cell edge
2). The channel coding applied to the cell edge bands is
20 identical to TFCS1. Power control of the DSCH is examined
by the RNC, and decisions to switch a UE between TFCSs
can then be made (as in published patent publication WO
03/049320). The TFCS in use is then used in determining
the power consumption on the FACH when serving this UE
25 (see below for details) - this is the 'power cost'
introduced above. Consequently, the number of FACHs that
may be scheduled is determined. For example, four UEs of
band status from 1 to 8 may be served (on four FACHs,
four S-CCPCH CCTrCHs), but if a cell edge 2 UE is to be
30 served then only this UE may be served in this frame.

The power costs calculated are given in Table 1 below
(for the case where 1 FACH is mapped to 2 S-CCPCH codes).

TFCS	FACH power cost
TFCS1 cell edge 2	1.00
TFCS1 cell edge 1	0.50
TFCS1	0.25
TFCS2	0.25
TFCS3	0.25
TFCS4	0.25
TFCS5	0.25
TFCS6	0.25
TFCS7	0.25
TFCS8	0.25

Table 1

5   It should be noted that when transmitting to users from
any of the TFCS bands from 2 to 8, the same power cost as
TFCS1 is assumed. A more sophisticated algorithm that
adjusts the power cost across the complete TFCS range is
described below.

10

Clearly the number of FACHs transmitted will now be
variable since it will depend on the DSCH TFCS which is
applied to the UEs to which the FACHs are to be sent. The
MAC will be required to provide this scheduling and

15   determine how many FACHs that can be let through to
Layer 1 and be consequently be transmitted.

It is likely that at any one time FACHs will be needed to
be transmitted to users which are on different DSCH TFCS

20   and therefore a scheme will be employed in the MAC based
on ratio of the total power available to the required

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power for each FACH (called a FACH power cost), as
illustrated in FIG. 8, where four FACHs (810_1, 810_2, 810_3
and 810_4) are to be transmitted.

5   All messages sent on the Common Control Channel (CCCH),
or where the DSCH TFCS is not known, will have a FACH
cost of 1.0.

An enhancement of the invention performs the power
10   management under the assumption that the C/I should be met
but not exceeded for users in different bands. In this
enhancement, Table 1 may be revised as follows:

TFCS	FACH power cost
TFCS1 cell edge 2	1.00
TFCS1 cell edge 1	0.50
TFCS1	0.25
TFCS2	0.19
TFCS3	0.13
TFCS4	0.09
TFCS5	0.07
TFCS6	0.05
TFCS7	0.03
TFCS8	0.01

Table 2

15. When using Table 2, the FACH power control must ensure
that the available FACH CCTrCH code resource is not
exceeded as FACH blocks are added to the schedule. With
Table 1 this is not necessary, since the minimum power
cost of 0.25 ensures that at most four FACHs (which
20   corresponds to 8 S-CCPCH codes) can be scheduled, which
represents the code limitation of FACH CCTrCHs.

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It will be understood that the present invention is not limited to FACH power determination based upon the method of TFCS selection described above. The FACH power may be estimated provided that indication of the DSCH power consumption is passed to the FACH scheduler, located within the RNC.

Under typical conditions, the FACH and DSCH timeslots are heavily loaded, and the C/I achievable in these slots is approximately equal. In such circumstances, the FACH power management scheme should work well. However, if the network is lightly loaded, either in FACH or DSCH slots, then the performance of the algorithm is impacted. For this reason, the RNC may determine whether to use the power control algorithm based on DSCH operation (as described above) or a conventional measurement based calculation of the C/I achievable at the UE. In this way, the DSCH based algorithm may only be used if the loading on the DSCH in the neighbouring cells is high (the mean code consumption over a set of neighbour cells on the DSCH in the timeslots for which the UE has been granted DSCH resource over a predefined time period exceeds a threshold) and the immediate loading on the FACH is high in the neighbouring cells (determined using a threshold on the queued FACH traffic across the neighbour cells).

It will be understood that the method and arrangement for power control in a radio communication system described above provides the following advantages:

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- maximisation of throughput on FACH(s)

- exploitation of DSCH power control removes the need for additional measurements to be taken by the UE

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Claim(s)

1.   A method for power control in a communication system
employing first and second channels, comprising:

5   applying power control on the first channel;
         deriving power control information from the power
             control on the first channel; and
         applying to the second channel the derived power
             control information from the power control on the

10   first channel in order to produce power control on
             the second channel.

2.   The method of claim 1 wherein the second channel
comprises a forward access control channel.

15

3.   The method of claim 1 or 2 wherein the first
channel comprises a downlink shared control channel.

4.   The method of any one of claims 1-3 wherein the step

20 of deriving power control information from the power
control on the first channel comprises deriving power
control information from a radio network control power
control function.

25 5.   The method of any one of claims 1-3 wherein the step
of deriving power control information from the power
control on the first channel comprises deriving power
control information from a base station power control
function.

30

6.   The method of any one of claims 1-3 wherein the step
of deriving power control information from the power
control on the first channel comprises deriving power
control information from transport format combination set
5   selection.

7.   The method of any one of claims 1-6 wherein the step
of applying power control information to the second
channel comprises scheduling a plurality of second
10 channels in dependence on the derived power control
information.

8.   The method of claim 7 wherein the step of scheduling
comprises scheduling the plurality of second channels
15 based on signal/interference difference power cost
calculation.

9.   The method of claim 7 or 8 wherein the step of
scheduling comprises scheduling the plurality of second
20 channels based on fixed signal/interference values.

10.   The method of claim 7 or 8 wherein the step of
scheduling comprises scheduling the plurality of second
channels based on dynamically updated signal/interference
25 values.

11.   The method of any one of claims 1-10 wherein the
step of applying power control information to the second
channel comprises queueing and serving of mobile stations
30 with similar power requirements on a same second channel
at the same time.

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12. The method of any one of claims 1-11 wherein the system is a time division duplex communication system.

5   13. The method of any one of claims 1-12 wherein the system comprises a UMTS wireless system.

14. The method of claim 13 wherein the system comprises a 3GPP system.

15.   An arrangement for power control in a communication
system employing first and second channels, the
arrangement comprising:
   means for applying power control on the first channel;
5   means for deriving power control information from the
      power control on the first channel; and
   means for applying to the second channel the derived
      power control information from the power control on
      the first channel in order to produce power control
10   on the second channel.

16.   The arrangement of claim 15 wherein the second
channel comprises a forward access control channel.

15 17.   The arrangement of claim 15 or 16 wherein the first
channel comprises a downlink shared control channel.

18.   The arrangement of any one of claims 15-17 wherein
the means for deriving power control information from the
20 power control on the first channel comprises means for
deriving power control information from a network control
power control function.

19.   The arrangement of any one of claims 15-17 wherein
25 the means for deriving power control information from the
power control on the first channel comprises means for
deriving power control information from a base station
power control function.

30 20.   The arrangement of any one of claims 15-17 wherein
the means for deriving power control information from the

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power control on the first channel comprises means for
deriving power control information from transport format
combination set selection.

5   21. The arrangement of any one of claims 15-20 wherein
the means for applying power control information to the
second channel comprises means for scheduling a plurality
of second channels in dependence on the derived power
control information.
10

22. The arrangement of claim 21 wherein the means for
scheduling comprises means for scheduling the plurality
of second channels based on signal/interference
difference power cost calculation.
15

23. The arrangement of claim 21 or 22 wherein the means
for scheduling comprises means for scheduling the
plurality of second channels based on fixed
signal/interference values.
20

24. The arrangement of claim 21 or 22 wherein the means
for scheduling comprises means for scheduling the
plurality of second channels based on dynamically updated
signal/interference values.
25

25. The arrangement of any one of claims 15-24 wherein
the means for applying power control information to the
second channel comprises means for queueing and serving
of mobile stations with similar power requirements on a
30   same second channel at the same time.

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26.   The arrangement of any one of claims 15-25 wherein
the system is a time division duplex communication
system.

5   27.   The arrangement of any one of claims 15-26 wherein
the system comprises a UMTS wireless system.

28.   The arrangement of claim 27 wherein the system
comprises a 3GPP system.

10

29.   A network control element comprising the arrangement
of claim 18 or any one of claims 18-28 when dependent
from claim 18.

15   30.   A base station element comprising the arrangement of
claim 19 or any one of claims 19-28 when dependent from
claim 19.

31.   A method, for power control in a communication
20   system, substantially as hereinbefore described with
reference to the accompanying drawings.

32.   An arrangement, for power control in a communication
system, substantially as hereinbefore described with
25   reference to the accompanying drawings.

33.   A base station element, for power control in a
communication system, substantially as hereinbefore
described with reference to the accompanying drawings.

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34.   A network control element, for power control in a
communication system, substantially as hereinbefore
described with reference to the accompanying drawings.

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Abstract

METHOD AND ARRANGEMENT FOR POWER CONTROL IN A COMMUNICATION SYSTEM

5

A method and arrangement, for power control in a
communication system (100) employing first and second
channels, by: applying power control on the first
channel, deriving (910) power control information from

10 the power control on the first channel, and applying
(920) to the second channel the derived power control
information from the power control on the first channel
in order to produce power control on the second channel.
Preferably, DSCH power control is used to determine power

15 consumption on FACH. The power control information may be
obtained: directly from RNC power control entity (if RNC
based power control), or indirectly from Node B power
control entity (if TPC power control at the Node B). The
power control on the second channel may be obtained: via

20 TFCS selection, scheduling of FACHs (number of codes /
data rate) using a power management calculation based on
the above, power cost calculation using C/I difference
method, use of fixed or dynamically updated C/I values,
or queueing and serving of UEs with similar power

25 requirements on the FACH at the same time.
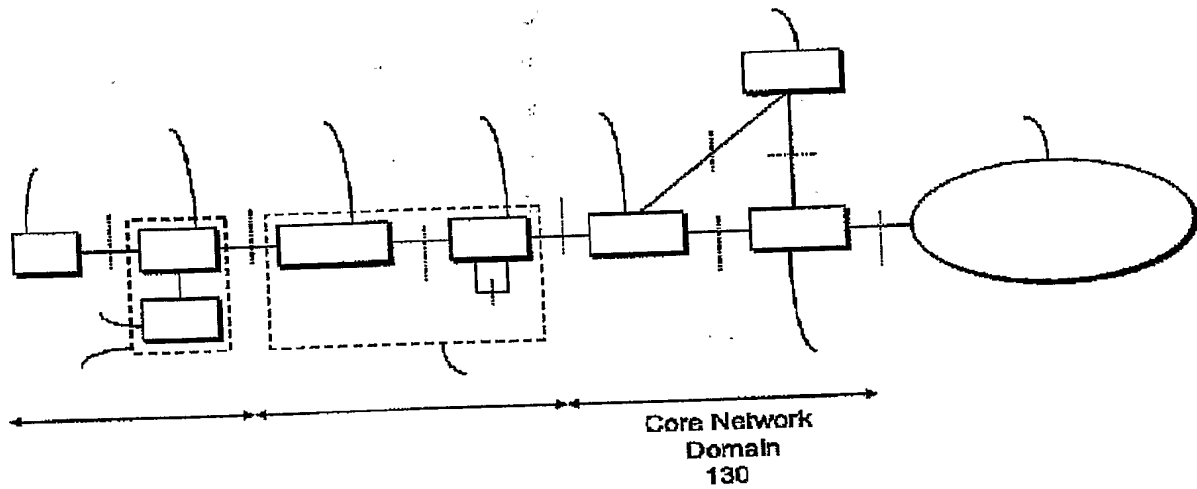This provides the following advantage(s):
- maximisation of throughput on FACH(s)
- exploitation of DSCH power control removes the need for
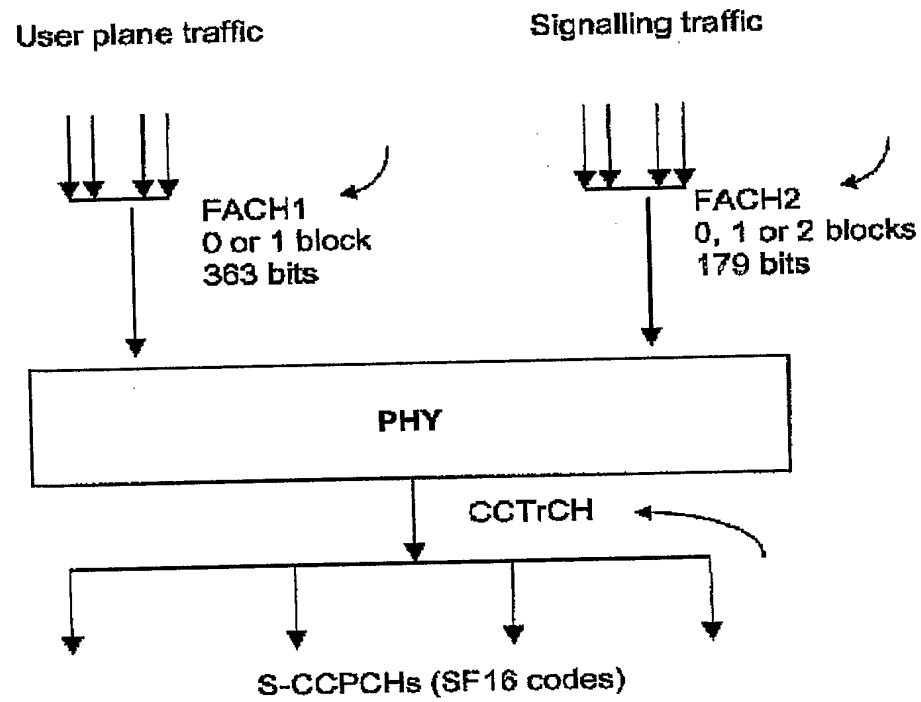additional measurements to be taken by the UE.

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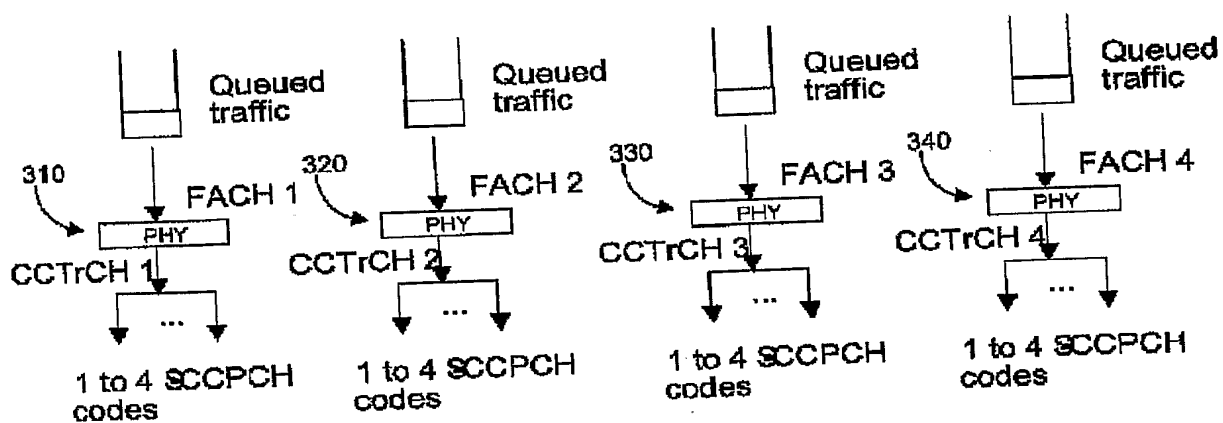
Core Network
Domain
130

User plane traffic   Signalling traffic

FACH1
0 or 1 block
363 bits

FACH2
0, 1 or 2 blocks
179 bits

PHY

CCTrCH

S-CCPCHs (SF16 codes)

FIG. 2

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FIG. 3

FIG. 4

FIG. 5

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TFCS1   TFCS2   ○ ○ ○   TFCS8

Traffic queued by TFCS band
Serve one band at a time

FACH

PHY

CCTrCH

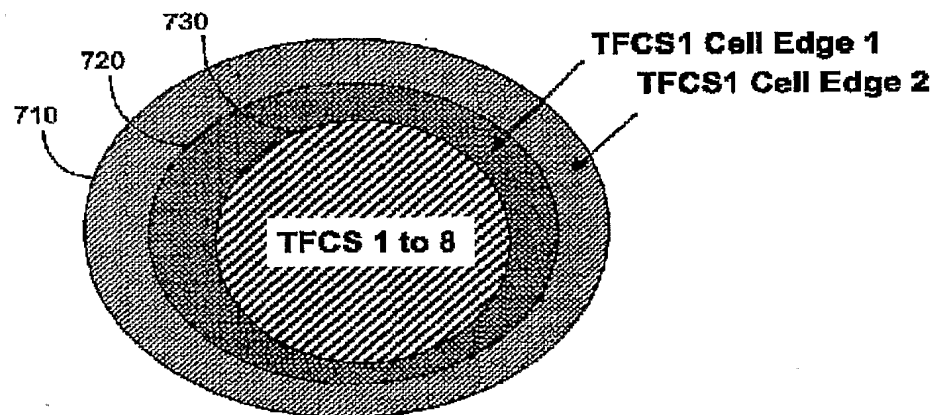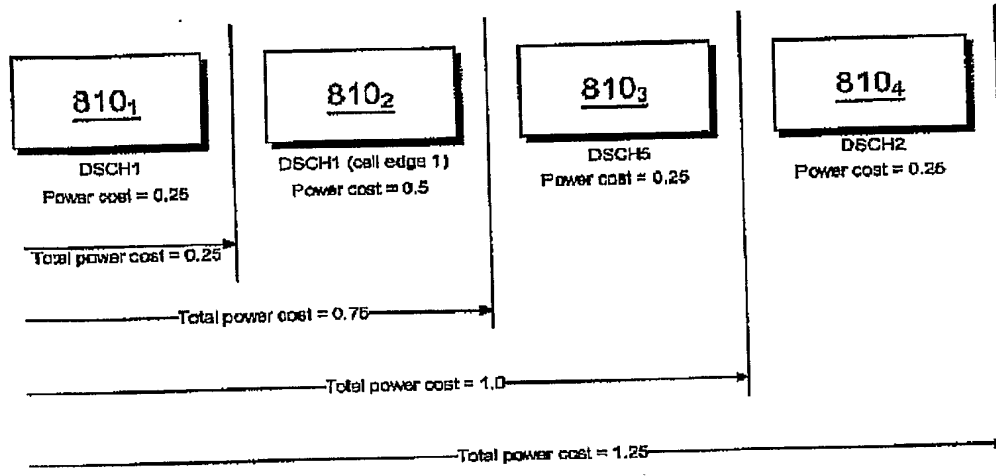S-CCPCHs (SF16 codes)

FIG. 6

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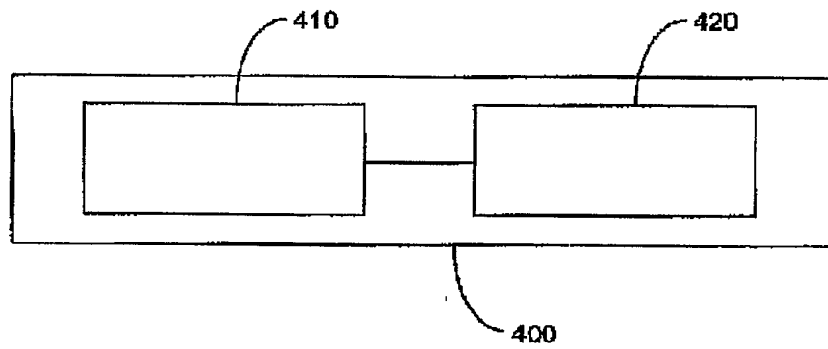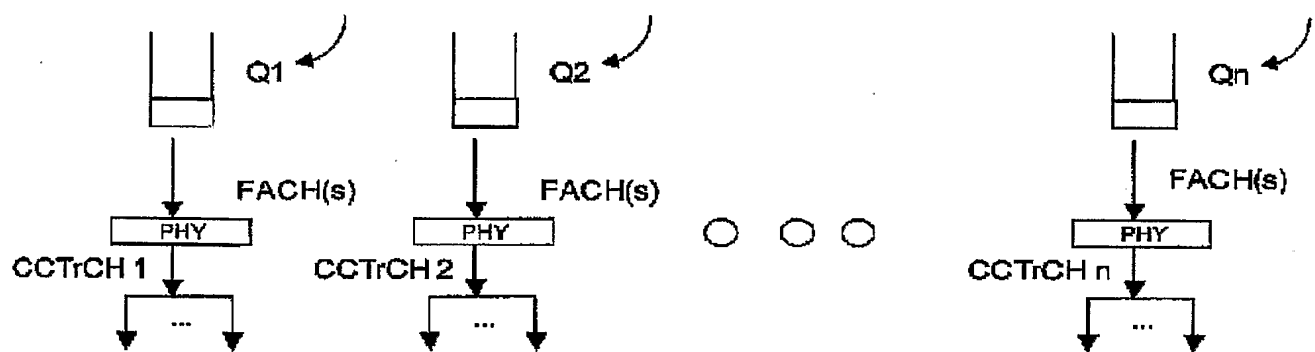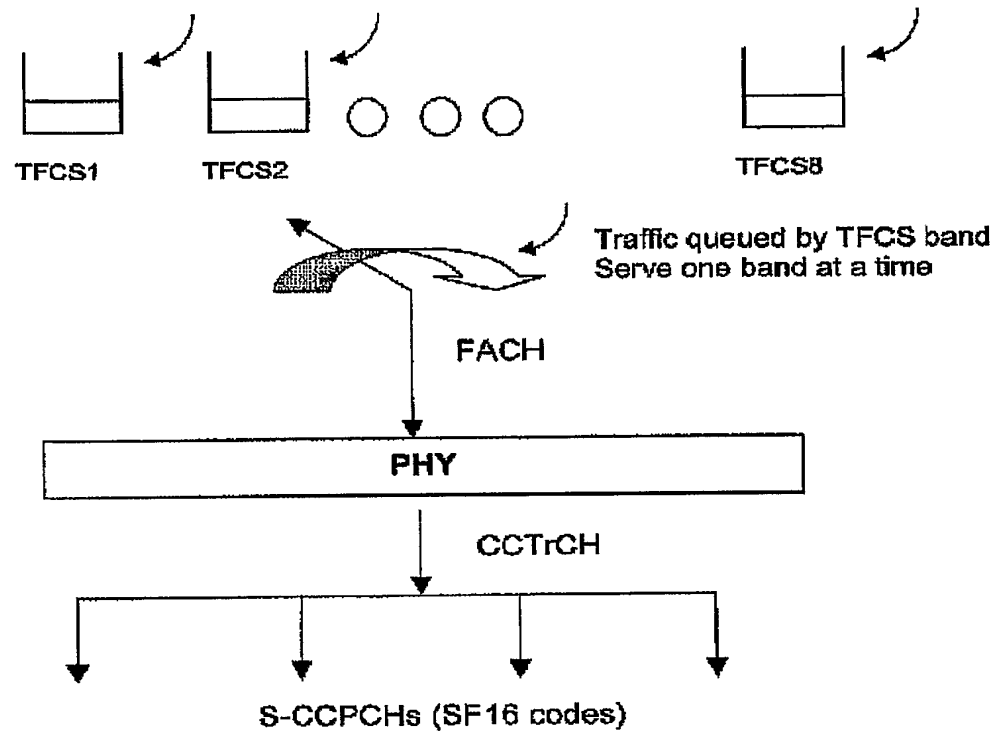
FIG. 7

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In this TTI can send FACH 1,2 and 3.

Cannot send FACH 4 in this TTI.

FIG. 8